

Projectile Motion:

- Assumptions:

1. Object is in free-fall

2. Ignore air resistance

- Treat x- and y-directions independently

- Variables:

- x-direction:

$v_{ix}, v_{fx}, \Delta x, a_x (= 0 \text{ m/s}^2)$

- y-direction:

$v_{iy}, v_{fy}, \Delta y, a_y (= a_g = g = 9.8 \text{ m/s}^2)$

- both directions:

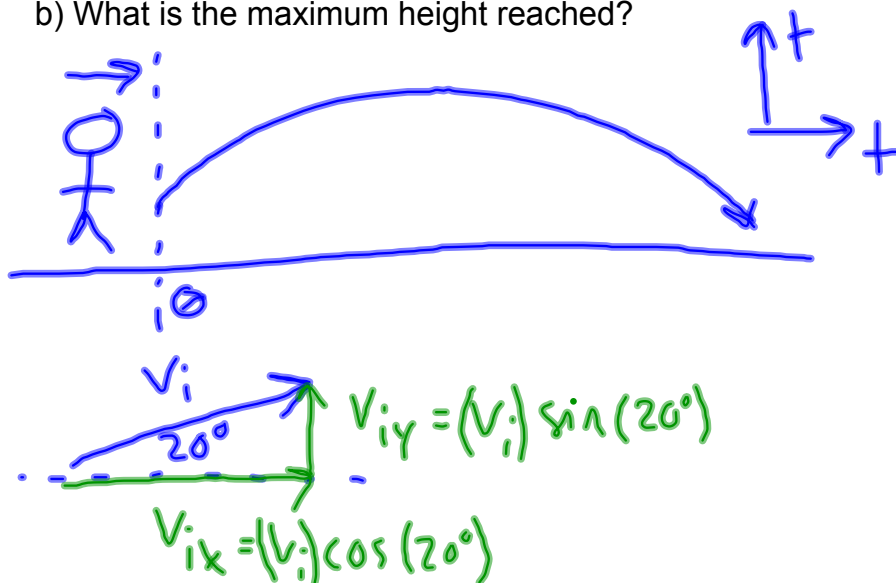
θ_i, θ_f, t

\hookrightarrow initial angle \hookrightarrow final angle

Projectile Motion Notes and Practice Problems AP Physics 8.29.11

A long jumper leaves the ground at an angle of 20.0 degrees above the horizontal and at a speed of 11.0 m/s.

- How far does he jump in the horizontal direction?
- What is the maximum height reached?



$$\Delta x = ? \quad v_{ix} = 10.34 \text{ m/s}$$

$$a_y = -9.8 \text{ m/s}^2 \quad v_{iy} = 3.76 \text{ m/s}$$

$$t = ? \quad \Delta y = ? \quad a_x = 0 \text{ m/s}^2$$

$$v_{fx} = 10.34 \text{ m/s} \quad v_{fy} = -3.76 \text{ m/s}$$

$$A) \quad v_{fx}^2 = v_{ix}^2 + 2a\Delta x$$

A ski jumper leaves the ski track moving in the horizontal direction with a speed of 25.0 m/s. The landing incline below her falls off with a slope of 35.0 degrees below the horizontal. Where does she land on the incline?

A stone is thrown from the top of a building horizontally with an initial speed of 20.0 m/s. The height of the building is 45.0 m.

- a) How long does it take the stone to reach the ground?
- b) What is the speed of the stone just before it strikes the ground?

A stone is thrown from the top of a building upward at an angle of 30.0 degrees to the horizontal with an initial speed of 20.0 m/s. The height of the building is 45.0 m.

- a) How long does it take the stone to reach the ground?
- b) What is the speed of the stone just before it strikes the ground?